



Department of Transportation  
**Federal Aviation Administration**  
Aircraft Certification Service  
Washington, D.C.

<b>TSO-C39c</b>
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Effective  
Date: 2/13/04

# Technical Standard Order

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**Subject: 9g TRANSPORT AIRPLANE SEATS CERTIFIED BY STATIC TESTING**

**1. PURPOSE.** This Technical Standard Order (TSO) tells persons seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) that their aircraft seats must first meet in order to obtain approval and be identified with the applicable TSO-C39c marking:

Type A - Transport Airplane

“Type I” was changed to “Type A” when TSO-C39c was issued. Type A seats must meet the requirements in section 3 of this document.

Persons seeking a TSO authorization or letter of design approval for seats used in the following types of aircraft can still apply for TSO-C39b:

Type II - Normal, Utility, and Commuter  
Type III - Acrobatic  
Type IV - Rotorcraft

TSO authorizations or letters of design approval for seats formerly designated as Type I for use in transport airplanes will no longer be issued. All new TSO authorizations or letters of design approval for seats used in transport airplanes must be issued as TSO-C39c, Type A seats. All TSO-C39b authorizations or letters of design approval issued prior to TSO-C39c remain valid including those issued for Type I seats.

## **2. APPLICABILITY.**

**a.** This TSO is effective for new applications for Type A seats submitted after the effective date of this TSO. TSO-C39b is still effective for Type II, III, and IV seats as described above and for aircraft berths. Applications for Type I seats will not be accepted after the effective date of this TSO. However, applications submitted against the previous version of this TSO for Type I seats may be accepted up to six months after the effective date of this TSO, in cases where we know that the applicant was working against the earlier MPS before the new change became effective.

b. Seats and berths approved under a previous TSO authorization may continue to be manufactured under the provisions of their original approval, as specified in 14 CFR § 21.603(b). However, major design changes to seating systems approved under previous versions of this TSO require a new authorization under this TSO, per Title 14 of the Code of Federal Regulations (14 CFR) § 21.611(b).

**3. REQUIREMENTS.** New models of seating systems that are to be so identified and are manufactured on or after the effective date of this TSO must meet the MPS, qualification requirements, and minimum documentation requirements set forth in Sections 3.2, 3.3, 3.4 (except 3.4.2), 3.5, 4 (except 4.2), 5 (except 5.3 and 5.4) of the Society of Automotive Engineers, Inc. (SAE), Aerospace Standard (AS), 8049 Rev. A, “Performance Standard for Seats in Civil Rotorcraft, Transport Aircraft, and General Aviation Aircraft” dated September 1997 when revised by paragraph 3.a of this document.

a. In order to meet this TSO, SAE AS8049 Rev. A must be revised to as follows:

(1) Disregard first paragraph in section 3.2 Requirements.

(2) Revise Section 3.2.1 of AS 8049 Rev. A as follows:

Seat systems shall be designed to provide protection for the occupant at seat adjustment positions, orientations, and locations allowed to be occupied during takeoff and landing.

(3) Revise Section 3.2.2 of AS 8049 Rev. A as follows:

Seat elements shall be designed so that, when evaluated under the static test conditions of this document, they do not leave hazardous projections that could significantly contribute to occupant injury or impede rapid evacuation.

(4) Revise Section 3.2.6 of AS 8049 Rev. A as follows:

Adjustable features (seat swivel, back recline, and stowage of movable tables, armrests, footrests, etc.) shall be designed to permit the seat occupant access to those features to adjust to the positions required for takeoff and landing without releasing the occupant’s restraints.

(5) Revise Section 3.2.7 of AS 8049 Rev. A as follows:

When an under-seat baggage restraint is incorporated in a passenger seat, it shall be designed to restrain at least 9.1 kg (20 lb) or its placarded weight of stowed items per passenger place under the static test conditions of this document in a manner that will not significantly impede rapid egress from the seat.

(6) Revise Section 3.5 of AS 8049 Rev. A as follows:

Allowable permanent deformations sustained by a seat subjected to the ultimate static tests of this document are specified below. Permanent seat deformations shall be measured on the critically loaded seat after static tests. Significant measuring points shall be identified and marked on the test seat, and their positions measured in the lateral, vertical, and longitudinal directions relative to fixed points on the test fixture. Measurement of the selected points shall be recorded before and after the tests. Posttest deformations shall be recorded and reported.

(7) Revise Section 4 of AS 8049 Rev. A as follows:

STRENGTH:

All seats qualified for occupancy during takeoff and landing shall be capable of withstanding, within the criteria defined below, statically applied loading.

**(8) Revise Section 5 of AS 8049 Rev. A as follows:**

**QUALIFICATION TESTS:**

Initial qualification of a seat shall be performed by static tests. Subsequent qualifications related to design changes to seats of a similar type may be performed by rational analysis based on existing qualification test data.

**b.** In addition to the requirements above, paragraphs 3.1.4, 3.1.8, 3.1.11 (as revised below), 3.1.14, 3.1.15, 3.1.17, 3.1.18, 3.1.19, and 3.1.20 of SAE AS 8049 Rev. A are requirements of this TSO and must be met before identifying any article per the marking requirements of Section 4 of this TSO.

**(1) Revise Section 3.1.11 of AS 8049 Rev. A as follows:**

Restraint system anchorages should provide self-aligning features. If self-aligning features are not provided, the static tests in this document should be conducted with the restraints and anchorages positioned in the most adverse configuration allowed by the design. The anchorage system should minimize the possibility of incorrect installation or inadvertent disconnection of the restraints.

**c.** Seat cushions, when included, for transport airplane passenger, flight attendant, and observer seats must be tested and must meet the fire protection provisions of Appendix F, Part II of 14 CFR Part 25, as required in 14 CFR 25.853(c) effective March 6, 1995 or the equivalent must be demonstrated by analysis (similarity) to provide equivalent protection.

**d. Deviations.** The FAA has provisions for using alternative or equivalent means of compliance to the criteria set forth in the MPS of this TSO. Applicants invoking these provisions shall demonstrate that an equivalent level of safety is maintained and shall apply for a deviation per 14 CFR § 21.609.

**4. MARKING.** Under 14 CFR § 21.607(d), articles manufactured under this TSO must be marked as follows:

**a.** At least one major component must be permanently and legibly marked with all of the information listed in 14 CFR § 21.607(d), except for the following: the option in 14 CFR § 21.607(d)(2), where the name, type and part number must be used in lieu of the optional model number; and the option in 14 CFR § 21.607(d)(3), where the date of manufacture must be used in lieu of the optional serial number. The marking must also include the appropriate seat facing direction designation: “FF”-forward; “RF”-rearward; or “SF”-sideward.

**b.** In addition to the requirements of 14 CFR 21.607(d), each passenger, flight attendant, and observer seat cushion required for qualification of the seating system must be marked with “Complies with 14 CFR 25.853(c) effective March 6, 1995” when tested in accordance with the requirements of Section 3.c.of this TSO.

**5. DATA REQUIREMENTS.**

**a. Application Data.** Under 14 CFR § 21.605(a)(2), the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), responsible for the manufacturer's facilities, one copy each of the following technical data to support the FAA design and production approval:

(1) Operating instructions and equipment limitations. The limitations shall be sufficient to describe the operational capability of the equipment. In particular, operational or installation limitations resulting from specific deviations granted must be described in detail.

(2) Installation procedures and limitations. The limitations shall be sufficient to ensure that the seating system, when installed according to the installation procedures, continues to meet the requirements of this TSO. The limitations shall identify any unique aspects of the installation. Finally, the limitations also shall include a note with the following statement:

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

(3) Schematic drawings, as applicable to the installation procedures.

(4) Wiring diagrams, as applicable to the installation procedures.

(5) List of the components, by part number, that make up the seating system complying with the standards prescribed in this TSO. Manufacturers should include vendor part number cross-references when applicable.

(6) Instructions, in the form of a Component Maintenance Manual (CMM) containing information on the periodic maintenance, calibration and repair, for the continued airworthiness of installed seating systems, including recommended inspection intervals and service life. Details of deviations granted, as noted in paragraph 5.a.(1) of this TSO, may also be described in the CMM.

(7) Material and process specifications list.

(8) The quality control system description required by 14 CFR §§ 21.605(a)(3) and 21.143(a) including functional test specifications to be used to test each production article to ensure compliance with this TSO.

(9) Manufacturer's TSO qualification test report.

(10) Nameplate drawing providing the information required by paragraph 4 of this TSO.

(11) A list of all drawings and processes, including revision level, necessary to define the article's design. In the case of a minor change, any revisions to the drawing list need only be made available upon request.

(12) Flammability test results on representative seat cushions with dress covers conducted per Section 3.c of this TSO.

(13) Static qualification test results on the seating system as per Section 5.1 of SAE AS 8049 Rev. A.

**b. Manufacturer Data.** In addition to the data to be furnished directly to the FAA, each manufacturer must have available for review by the manager of the ACO responsible for the manufacturer's facilities the following technical data:

(1) The functional qualification specifications to be used to qualify each production article to ensure compliance with this TSO.

(2) Equipment calibration procedures.

(3) Corrective maintenance procedures within 12 months after TSO authorization.

(4) Schematic drawings.

(5) Wiring diagrams.

(6) Material and process specifications.

**c. Furnished Data.** One copy of the Application Data specified in paragraphs 5.a.(1) through 5.a.(6) of this TSO and any other data or information necessary for the proper installation, certification and use and/or for continued airworthiness of the seating system, must accompany each article or multiple articles, if furnished to one source, i.e. operator, type certificate holder, etc., manufactured under this TSO.

## **6. AVAILABILITY OF REFERENCED DOCUMENTS.**

**a.** You may buy copies of SAE AS8049 Rev. A from the Society of Automotive Engineers Inc., Department 331, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies also can be obtained through the SAE Internet website @ [www.sae.org](http://www.sae.org).

**b.** You may buy copies of Federal Aviation Regulations 14 CFR part 21, Subpart O, 14 CFR Part 23, 14 CFR Part 25, 14 CFR Part 29, and 49 CFR Part 572 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325. Copies also can be obtained from the Government Printing Office (GPO), electronic CFR Internet website @ <http://www.gpoaccess.gov/ecfr>.

c. Advisory Circular (AC) 20-110, "Index of Aviation Technical Standard Orders," and AC 20-36, "Index of Articles Certified under the Technical Standard Order System" may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75<sup>th</sup> Avenue, Landover, MD 20785, telephone (301) 322-4477 or FAX (301) 386-5394. Copies also may be obtained from the FAA Internet website at <http://www2.faa.gov/regulations/Guidance.cfm> and select the "Advisory Circulars" option.

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